2004 Missouri Health Care Insurance and Access Survey: Select Results

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Report to:

Missouri Department of Health and Senior Services

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The Division of Behavioral and Minority Research at the University of Missouri, Columbia, fielded the 2004 Missouri Health Care Insurance and Access Survey. The authors would like to acknowledge the work of Keith Onken at the Center for Health Research at the University of Minnesota for his consultation on the programming of the survey instrument.

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Executive Summary

Missouri's rate of uninsurance has historically been relatively low, with current estimates ranging from 11.0% to 13.2%, according to the Current Population Survey and the Behavioral Risk Factor Surveillance System, respectively.[1,2] This report presents findings from the 2004 Missouri Health Care Insurance and Access Survey, conducted between March 2004 and July 2004. For Missouri residents of all ages, this survey estimates that 8.4% are uninsured (approximately 463,000 Missourians). For children ages 0-18, the uninsurance rate is 3.4%; and for adults ages 19-64, the rate is 12.3%.

More than 45 million Americans are uninsured and these numbers are increasing with the continuing economic downturn. Recent data from the US Census indicate that the number of uninsured Americans increased by 1.0 million people nationally from 2002 to 2003—an increase from 15.2% to 15.6% of the population.[1] The problems faced by the uninsured amounts to one of America's biggest health challenges. Relative to their insured counterparts, the uninsured are more likely to miss recommended health screenings, have poor health outcomes, and lack access to important prescription medications. Enumerating the uninsured is a necessary first step in crafting options to extend health insurance coverage to those who do not have it.

Conducted by the Missouri Department of Health and Senior Services (MDHSS) with a grant from the U.S. Health Resources and Services Administration State Planning Grant (SPG) Program, the 2004 Missouri Health Care Insurance and Access Survey is the largest and most comprehensive survey on health insurance ever fielded in Missouri. With these survey data, Missouri will better understand the characteristics of the uninsured, thus enhancing the focus of its programs, policies, and outreach activities, and increasing its ability to identify currently uninsured individuals who are eligible for private or public health insurance coverage. The information from the survey can also be used as a baseline for monitoring changes over time.

While there are several national sources of data on the uninsured, states conduct their own surveys because the sample size for a given state is typically larger in a state survey than in a national one; and, larger sample sizes provide better estimates of uninsurance and more detailed information about the health insurance status of subpopulations. For example, the survey collected data about the accessibility of dental, mental health, vision and prescription drug coverage in the state to track the degree of underinsurance experienced by Missouri's currently insured population. In addition, by allowing state analysts to work "hands-on" with data, such surveys foster state-specific policy development, including simulation of health insurance coverage policy options, as well as marketing and outreach of public programs.

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[1] [2] U.S. Census Bureau, Current Population Survey, 2004 Annual Social and Economic Supplement, Accessed at http://ferret.bls.census.gov/macro/032004/health/h06_000.htm November 05, 2004

[2] National Center for Chronic Disease Prevention & Health Promotion, *Behavioral Risk Factor Surveillance System*, Prevalence Data, Missouri – 2002. Accessed at http://apps.nccd.cdc.gov/brfss/display.asp?cat=HC&yr=2002&qkey=868&state=MO on September 14, 2004.

The survey identified the following groupings, or sub-populations, that will be important in the development of coverage expansion options because of their disproportionately high rates of uninsurance. These sub-populations include:

- 19-24 year olds;
- Low income families below 150% of the Federal Poverty Level (FPL) – $28,275 for a family of four;
- Those with fair or poor health status; and
- Residents of the northeast and southeast regions of the state.

The survey produced four very important observations that will be critical in developing policies related to health insurance coverage:

- Young adults (ages 19-24) comprise the age group that is most likely to be uninsured. This finding, consistent with national data, highlights a coverage gap that occurs as young adults lose their status as dependents of their parents.
- Residents who reported fair or poor health status were more likely to be uninsured. This suggests a need for strategies to improve access to coverage among those with the greatest need for medical services.
- Approximately 58.1% of Missouri's uninsured residents do not have a regular source of care. Uninsured individuals identified the emergency room as their regular source of care at a disproportionate level compared with their insured counterparts. This finding suggests that strategies to identify regular sources of care for the uninsured – rather than an expensive emergency room – may be a future issue that will need to be addressed.
- The uninsured report fewer doctor visits and overnight hospital stays when compared to their publicly and privately insured counterparts. The expense associated with these services seems to be the principal driver of these problems, regardless of insurance type. Over one-third (38.9%) of the uninsured have had to forego needed health care due to cost.

Finally, a number of themes emerged around the issue of employer-based insurance coverage. The following groups were the most likely to be uninsured:

- Self-employed workers;
- Unemployed or unpaid individuals;
- Part-time, temporary or seasonal workers;
- Employees of firms with 10 or fewer employees; and
- Employees in agriculture and personal service industries.

The combination of continued state budget shortfalls, growing health care expenditures, and slowed growth in employment opportunities, especially those that offer health benefits suggests that efforts to increase health insurance coverage in Missouri will be difficult and that pursual of minor incremental strategies may prove advantageous, at least in the short term. Perhaps, as the economic situation improves, the task will become more manageable. In the meantime, with the implementation and results of the 2004 Missouri Health Care Insurance and Access Survey, Missouri can now monitor coverage over time, as well as measure the effects of any expansion strategies as they occur.

Chapter 1

Introduction

Why Was a Survey of Missouri Insurance Coverage Conducted?

In 2000, the Health Resources and Services Administration (HRSA) in the U.S. Department of Health and Human Services issued State Planning Grants (SPG) to eleven states to help them determine rates of health insurance at the state level and develop strategies to increase access to coverage. In 2001, an additional nine states were funded and in 2002, eleven states and one U.S. territory received HRSA SPG grants. In 2003, ten states were awarded HRSA SPG grants; Missouri was one of those states. The aims of the Missouri SPG were to measure and describe the uninsured in Missouri, the reasons why these individuals are uninsured, and to develop and evaluate a wide range of policy options to increase access to affordable health insurance coverage for Missouri residents. The in-depth quantitative and qualitative data collection and analysis conducted under the 2004 Missouri SPG will equip Missouri to do so.

Why Is Health Insurance Important?

There are a host of reasons for concern about access to health insurance and the many problems associated with being uninsured. Understanding the characteristics of both the uninsured and the insured allows policy makers and health care providers to make informed decisions and to better serve the public and anticipate the needs of communities.

Gaining a better understanding of the characteristics of the uninsured is critical to improving access to health care. Uninsured adults and children are less likely to have a regular physician or source of medical care, and they are less likely to receive preventive health care services.[3] In addition, the uninsured often delay seeking medical care when they are sick. As a result, many serious medical conditions are identified late and, consequently, are more costly to treat. In addition, uninsured persons have higher rates of avoidable hospitalization and higher rates of emergency room use – a high-cost method of receiving care.[4] Recent research suggests that providing health coverage to the uninsured may result in cost savings by decreasing hospital expenditures on uncompensated care.[5]

Studying health insurance coverage allows analysts to identify trends such as the rising costs of health care and health insurance, and reductions in employer-sponsored health insurance. According to a survey by the Employee Benefit Research Institute, between 2001 and 2002, 19% of small employers offering health benefits made changes to their health plans – 65% increased deductibles and co-pays, 30% increased the employee share of premiums, and 29% reduced

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[3] Brown, et. al. Monitoring the Consequences of Uninsurance: A Review of Methodologies. *Medical Care Research and Review*. 1998; 55:177-210.

[4] Ahern M, McCoy HV. Emergency Room Admissions: Changes During the Financial Tightening of the 1980s. *Inquiry*. 1992; 26:67-79.

[5] Blewett L, et al. Hospital Provision of Uncompensated Care and Public Program Enrollment. *Medical Care Research and Review.* 2003; 60:509-527.

benefits.[6] Erosion of employer-sponsored coverage not only affects individual employees, but it also affects the overall health and productivity of the marketplace, the viability of the health care system, and society at large.

Finally, inadequate health insurance coverage can negatively affect other areas of a person's life beyond physical health. For example, recent research shows that the uninsured are three times as likely as the insured to have difficulty paying for basic costs of living such as food, rent, heating or electric bills.[7] Not having insurance strains resources that are needed for other areas in one's life.

Who Conducted the 2004 Missouri Health Care Insurance and Access Survey?

The Division of Behavioral and Minority Research (DBMR) at the University of Missouri, Columbia fielded the 2004 Missouri Health Care Insurance and Access Survey. The State Health Access Data Assistance Center (SHADAC) completed the data analysis and worked with the Missouri Department of Health and Senior Services on interpreting the results of the data collection. The household survey instrument used for the data collection – the Coordinated State Coverage Survey (CSCS) – was developed by SHADAC and tailored to the special needs of Missouri.

The 2004 Missouri Health Care Insurance and Access Survey was a random digit dial (RDD) telephone survey. The survey specifically over-sampled Blacks and Hispanics. DBMR completed interviews with 6,995 people from the state, of which 275 were Hispanic (4.0% of the survey respondents) and 671 were Black (9.7% of the survey respondents). One person was randomly selected in each household to complete the telephone survey. If the selected person was a child, an adult was asked to respond on behalf of the child.

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[6]Employee Benefit Research Institute. Small Employers and Health Benefits: Findings from the 2002 Small Employer Health Benefits Survey. *EBRI Issue Brief.* January 2003. Accessed at www.ebri.org/findings/health_findings.htm September 07, 2004.

[7] Lambrew, Jeanne. *How the Slowing U.S. Economy Threatens Employer-Based Health Insurance*. New York: The Commonwealth Fund. November 2001. Accessed at www.cmwf.org September 09, 2004.

Chapter 2

Uninsured Individuals and Families

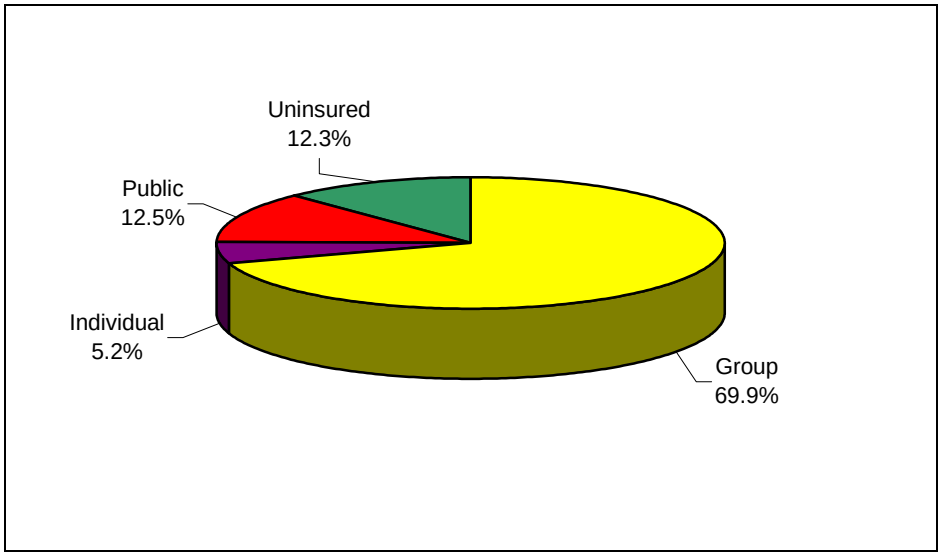
This chapter examines the overall level of uninsurance in Missouri and presents detailed information on the characteristics of Missouri's uninsured population. Analyses were performed to determine uninsurance rates of subpopulations grouped by age, race and ethnicity, employment status, family income, education, marital status, self-reported health status, and geographic location. Further analysis assessed whether certain groups are disproportionately uninsured.

What Is the Overall Level of Uninsurance in Missouri?

The results of the 2004 Missouri Health Care Insurance and Access Survey indicate the overall level of uninsurance for the state of Missouri, across all age groups, is 8.4% (approximately 463,000 individuals.) For adults ages 19-64 the uninsurance rate is 12.3%, and for children ages 0-18 the uninsurance rate is 3.4%.

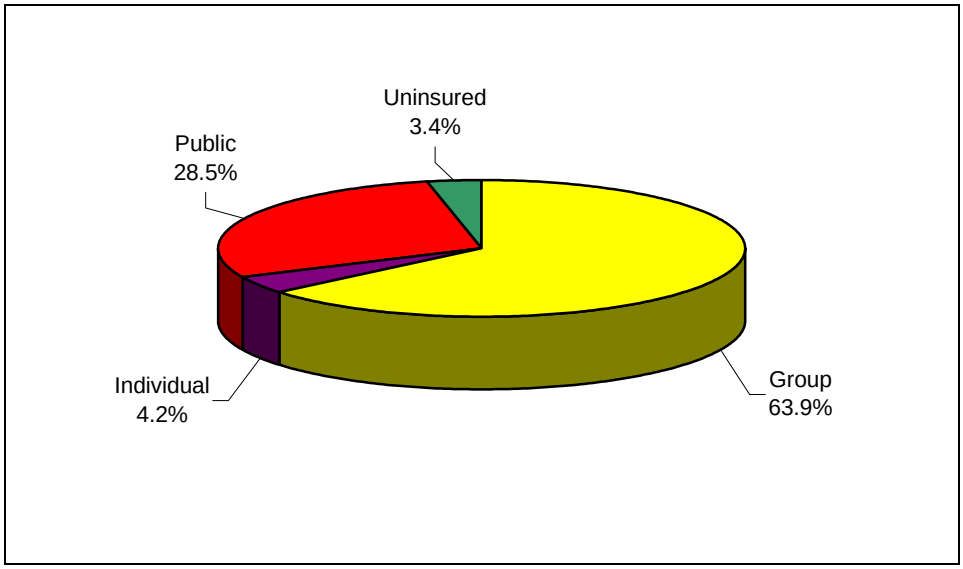
The various sources of health insurance among adults are displayed in Figure 2-1a. The majority (69.9%) of adults in Missouri are covered by health insurance through an employer. Missouri's public programs cover 12.5% of the adult population. An additional 5.2% purchased private individual insurance.

Figure 2-1a. Sources of Health Insurance in Missouri, 2004 (Adults 19-64 years)



The various sources of health insurance coverage among children are displayed in Figure 2-1b. Missouri's public programs cover a larger proportion of children (28.5%), while rates of group (63.9%) and individual coverage (4.2%) for children are similar to the rates of the adult population.

Figure 2-1b. Sources of Health Insurance in Missouri, 2004 (Children 0-18 years)



Estimated rates of uninsurance vary with the definitions of "uninsured" which, in turn, depend on the timeframe of the measurement. Four general timeframes are commonly used in measuring coverage: (1) at the time of the survey or point-in-time, (2) over an entire year, (3) for a portion of the year, and (4) all or part of the year.

Table 2-1 displays the range of commonly used time references and the corresponding rates of coverage for Missouri. The point-in-time measurement is the most commonly used measure in surveys. This approach minimizes concerns about recall bias. People who are uninsured at "some point during the year" is the largest rate, as the numerator comprises the number of full- and part-year uninsured, in addition to anyone who was uninsured for *any* length of time during the period covered by the survey. ***Throughout this report, unless otherwise indicated, the analyses refer to the "point-in-time" uninsured.***

Table 2-1. Alternative Definitions of Insurance Rates in Missouri, 2004

Definition	Missouri Uninsurance Rates
Point-in-time	8.4%
Uninsured All Year	6.6%
Uninsured Part Year	4.2%
Uninsured All or Part Year	10.9%

What Are the Characteristics of the Uninsured in Missouri?

Table 2-2 displays Missouri's uninsurance rates among select population groupings. Males' rate of uninsurance is 9.1%, whereas 7.8% of females are uninsured. Adults aged 19-24 have the highest rate of uninsurance at 20.1%, while children and the elderly have the lowest rates at 3.4% and 0.3%, respectively.

No significant differences in uninsurance rates were found across racial groups. This parity in coverage across racial and ethnic groups is not typical. National data indicate that rates of uninsurance tend to be higher among African Americans and Hispanics. Both of these groups were well-represented in the survey so the findings are somewhat unexpected.

Low-income families are more likely to be uninsured with the largest percentage of uninsurance exists in the group of people living at 134-150% FPL (20.9%). Education is positively associated with health insurance coverage. Rates of uninsurance decrease incrementally as level of education increases, with 15.3% of people who did not complete high school being uninsured compared to 3.0% of those with postgraduates degrees.

Married and widowed residents are more likely to have health coverage. Those reporting poor health status (13.3%) are uninsured at a rate over twice that of those reporting excellent health status (6.3%).

Table 2-2. Missouri's Uninsurance Rates by Selected Population Groups

	Uninsurance Rate	
Total Population	**8.4%**	
Gender		
Male	9.1%	
Female	7.8%	
Age		
0-5	2.6%	
6-18	3.8%	
19-24 (reference)	20.1%	
25-34	13.6%	*
35-54	10.9%	***
55-64	9.4%	***
65+	0.3%	
Race/Ethnicity		
White (reference group)	7.9%	
African American	10.6%	
Hispanic	10.4%	
Asian	7.6%	
American Indian	14.6%	
Other	9.2%	
Family Income (% FPL)		
<= 100%	14.3%	***
101-133%	15.7%	***
134-150%	20.9%	***
151-200%	12.4%	***
201-250%	9.0%	***
251-300%	7.8%	**
>301% (reference group)	3.6%	
Level of Education		
Less than HS (reference group)	15.3%	
HS graduate	11.9%	
Some College	7.0%	***
College Graduate	3.5%	***
Postgraduate	3.0%	***
Marital Status		
Married (reference group)	6.0%	
Never Married	17.2%	***
Living with Partner	12.0%	*
Divorced	13.6%	***
Separated	11.3%	
Widowed	3.4%	*
Health Status		
Excellent (reference group)	6.3%	
Very Good	8.2%	
Good	9.6%	**
Fair	11.0%	**
Poor	13.3%	**
Geographic Location		
Kansas City Metro	7.9%	
St. Louis Metro (reference group)	5.8%	
Central	9.8%	**
Southwest	10.4%	**
Southeast	11.9%	***
Northwest	8.9%	*
Northeast	13.1%	***
Non-MSA (reference group)	12.1%	
MSA	7.0%	***

* p<.05, ** p<.01, *** p<.001;

For those reporting Hispanic ethnicity and some other race, Hispanic was selected as racial classification. Note that American Indians appear to be significantly more likely to be uninsured however only 6 were interviewed.

Age groups (0-5, 6-18, and 65+) are not included in test of significance.

Figure 2-2 displays rates of uninsurance across geographical regions within Missouri, with the northeastern region of the state having the highest rate of uninsurance (13.1%), and the St. Louis metro area reporting the lowest (5.8%). Those living in an MSA (7.0%) have significantly lower rates of uninsurance than those living in a non-MSA (12.1%).

Figure 2-2. Rates of Uninsurance by Region

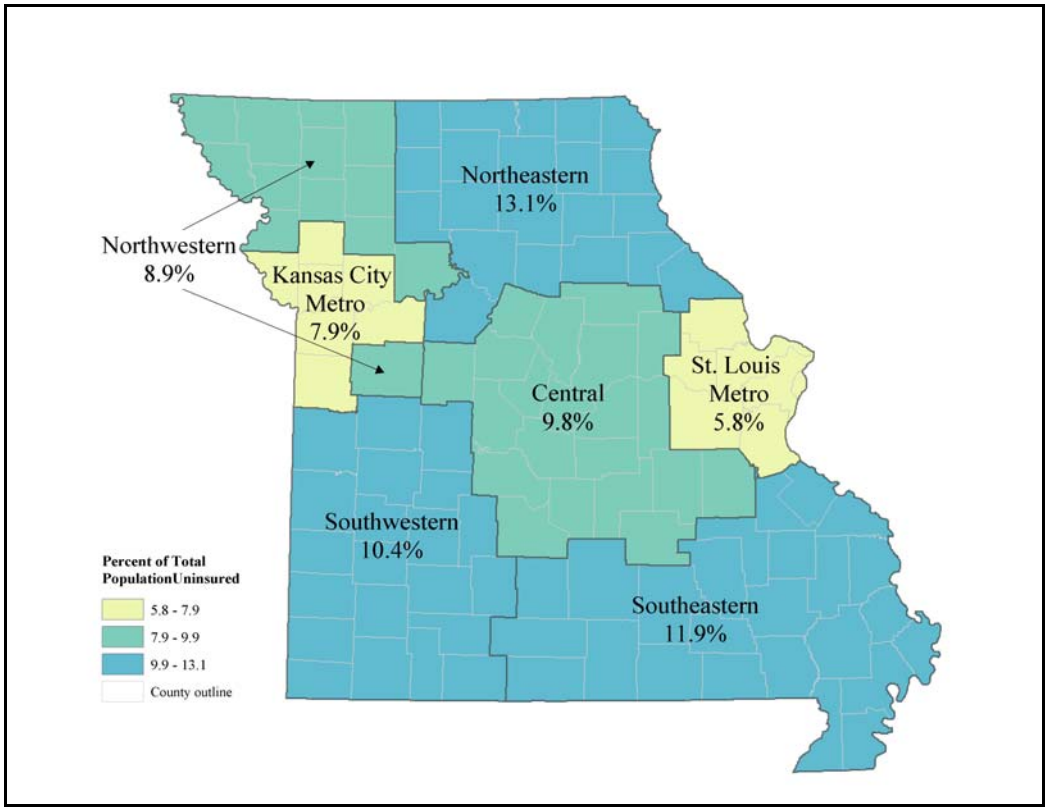


Table 2-3 shows uninsurance rates by employment characteristics. Self-employed residents of Missouri are uninsured at a rate nearly three times higher than those who are employed by someone else (19.1% vs. 6.6%). Missouri's unemployed also experience high rates of uninsurance at 15.0%.

Part-time employees working 21-30 hours a week are significantly more likely to be uninsured when compared to those working 41+ hours a week. Temporary and seasonal workers have rates of uninsurance three times greater than those with permanent jobs (20.9% and 29.2% vs. 6.7%). Employer size is also related to the likelihood of an employee receiving health insurance coverage: 1 out of 4 people employed by firms with less than 11 people, in contrast to 1 in 20 people employed by large firms (101+ people) are without health insurance.

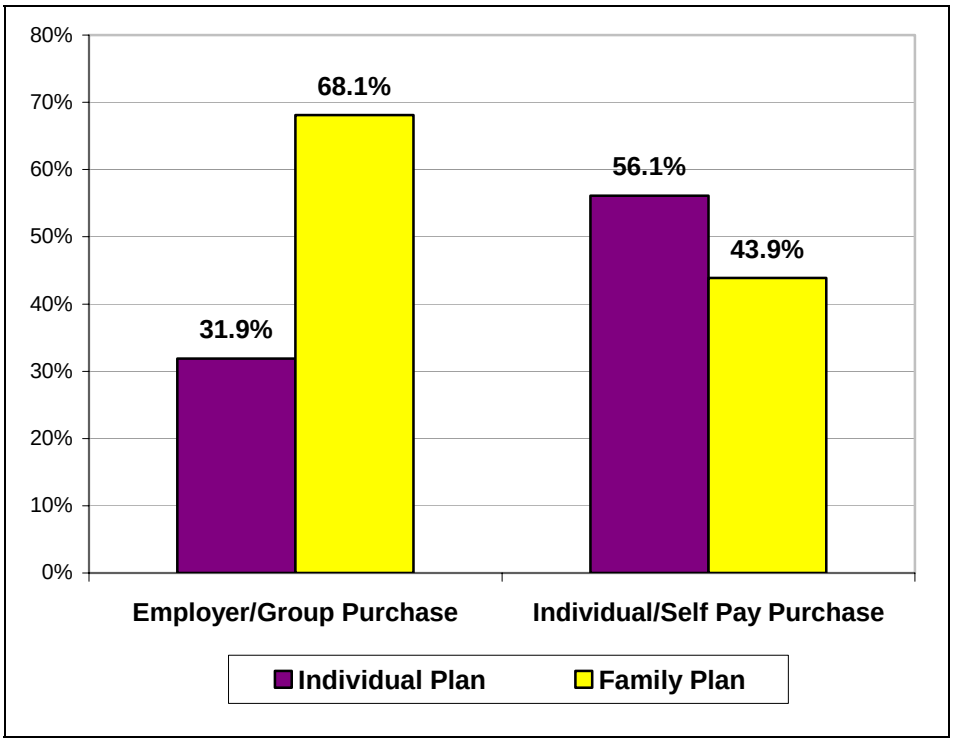
Table 2-3. Uninsurance Rates by Employment Characteristics

	Uninsurance Rate	
Total Population	**8.4%**	
Employment Status		
Self employed	19.1%	***
Employed by someone (reference group)	6.6%	
Unemployed/Unpaid	15.0%	***
Retired	2.4%	***
Student	11.0%	
Hours Worked per Week		
<11	9.8%	
11-20	10.1%	
21-30	20.7%	***
31-40	7.1%	
41+ (reference group)	5.4%	
Type of Job		
Permanent (reference group)	6.7%	
Temporary	20.9%	***
Seasonal	29.2%	***
Size of Employer		
<11	24.8%	***
11-50	11.7%	**
51-100	12.2%	*
101+ (reference group)	5.0%	

* p<.05, ** p<.01, *** p<.001

Whether a Missouri resident purchases an individual or family health insurance policy is influenced by whether the individual purchases the coverage on her own or through an employer or group. Figure 2-3 displays the type of coverage (individual or family) held by Missouri residents by purchasing method (employer/group and individual/self-pay). Missourians who purchase coverage through an employer or group are more likely to have family coverage than individual or self-pay consumers (68.1% vs. 43.9%).

Figure 2-3. Private Coverage Plans Among Adults (19-64 years) by Purchaser Type



What Population Groupings Are Particularly Important in Missouri for Developing Targeted Coverage Expansion Options?

Population groupings that characterize the uninsured are often interrelated. The following list highlights the groups that are most at risk of being without coverage and should therefore be considered when developing targeted coverage expansions in Missouri.

Young adults. Young adults ages 19-24 have the highest rate of uninsurance in the state at 20.1%, more than twice that of the overall state rate (8.4%).

Low-income families. Among residents of Missouri, uninsurance is most commonly experienced by those living in the lowest income brackets. For the population at or below 200% FPL, rates of uninsurance range from 12.4% to 20.9%.

Those with fair or poor health status. Residents with fair or poor health status had considerably higher rates of uninsurance than those with excellent health status (11.0% and 13.3% vs. 6.3%, respectively).

Residents of northeastern and southeastern regions. Missourians who live in the northeast and southeast regions report the highest rates of uninsurance, at 13.1% and 11.9%, respectively.

Residents of non-MSA regions. Missouri residents who live in non-MSA regions have higher rates of uninsurance than those in MSA regions (12.1% vs. 7.0%).

Self-employed workers. In addition, self-employed workers, often without access to purchasing pools, have high rates of uninsurance (19.1%).

Unemployed and unpaid workers. The unemployed and unpaid workers were more than twice as likely as employed individuals to be uninsured (15.0% vs. 6.6%).

Part-time, temporary and seasonal workers. Particularly vulnerable to uninsurance are Missouri residents working part-time (21-30 hours/week) (20.7%), temporary workers (20.9%) and those with seasonal jobs (29.2%).

Employees of small firms. One in four individuals working for small employers with less than 10 employees are uninsured.

Why Don't Uninsured Individuals Participate in Public Programs?

One expansion option that some states are considering is to decrease their uninsured rate by getting more eligible individuals to enroll in their existing public programs. Table 2-4 shows two subpopulations whose income levels make them potentially eligible for Medicaid by their coverage status. Survey results suggest that 4.0% of children and 9.0% of parents who are potentially eligible for public coverage remain uninsured.

Table 2-4. Uninsured but Potentially Eligible for Public Programs

	Insurance Type		
	Private	Public	Uninsured
Children under 19 years in families with income <=300% FPL	51.8%	44.2%	4.0%
Parents in families with income <=75% FPL	21.2%	69.8%	9.0%

To better understand Missouri residents' knowledge of public assistance, the survey asked uninsured respondents whether they had ever asked for or been given information about one of Missouri's public health programs, such as Medicaid. Three-fifths of the uninsured had neither requested nor received information about Missouri's public health insurance programs (Table 2-5). When further queried about interest in public health care coverage, 84.8% of the uninsured said they would be willing to enroll in a public coverage program, and an even larger proportion (92.2%) said they would be willing to enroll in a public plan at no cost.

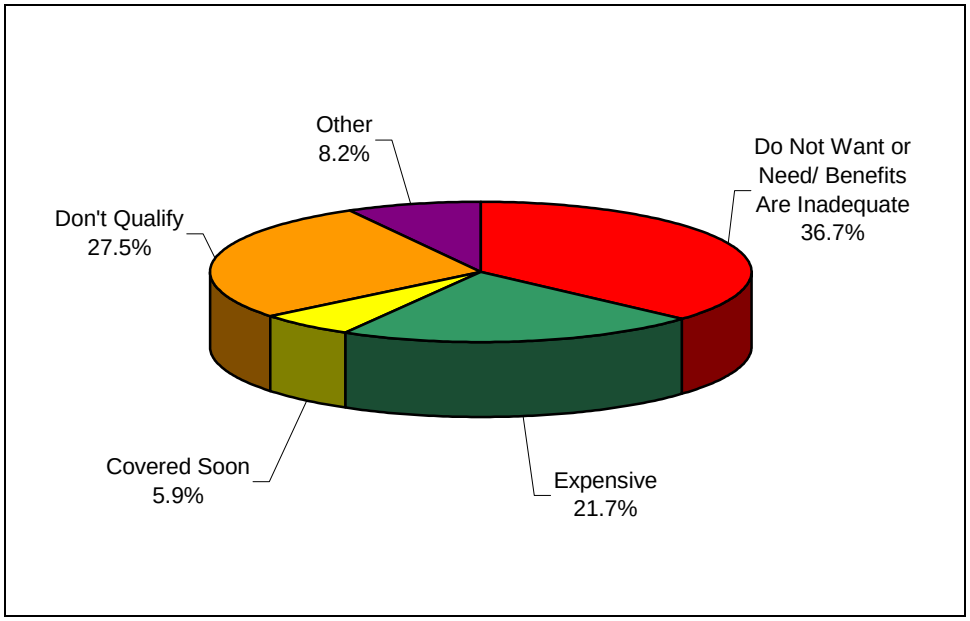
Table 2-5. Knowledge of and Interest in Public Coverage Among the Uninsured

	Yes	No
	(Percentage)	
Have Been Given Information about Public Programs	39.7%	60.3%
Willing to Enroll	84.8%	15.2%
Willing to Enroll at No Cost	92.2%	7.8%

Why Do Uninsured Individuals and Families Not Participate in Employer Sponsored Coverage for Which They Are Eligible?

Uninsured workers were asked why they do not participate in employer-sponsored coverage. As shown in Figure 2-4, the most common reason is they didn't want it, didn't need it, or thought the coverage offered was inadequate. Several respondents (27.5%) did not qualify for employer-sponsored coverage while 21.7% reported that the coverage was too expensive.

Figure 2-4. Uninsured and Eligible: Reasons for Not Enrolling in Employer- Sponsored Coverage



Are Individuals Likely to Be Influenced by Subsidies, Tax Credits, or Other Incentives?

The most frequently cited reason in the research literature for being without health insurance is cost. Among Missouri's uninsured, over 90% said they would be willing to enroll in public coverage if it was offered at no cost. These findings suggest that subsidies and financial incentives are a potentially promising means of helping the uninsured overcome barriers to coverage.

How Should Underinsured Be Defined? How Many Individuals Defined as "Insured" Are Underinsured?

In response to escalating health care costs and insurance premiums, many employers have increased employees' cost sharing for health insurance and/or have reduced the comprehensiveness of their health benefits. There is concern that these changes have led to growing numbers of underinsured individuals with inadequate health coverage for their medical needs.

Researchers have taken a number of different approaches to defining underinsurance or inadequate coverage. Economic approaches identify underinsurance in terms of an individual's ability to pay for health care needs and out-of-pocket costs such as premiums and deductibles.[8]

[8] Ward, A., Beebe, T.J., Blewett, L.A., and Smaida, S. Issues in Defining and Measuring Adequacy of Coverage. *State Health Access Data Assistance Center Working Paper*; 1992, p.3.

Structural approaches identify underinsurance in terms of whether the benefits provided by a health insurance plan are commensurate with some benchmark of benefits. Attitudinal approaches identify underinsurance in terms of the perceptions of the individual covered.

Taking an economic approach to studying underinsurance in Missouri, we examined the number of individuals who identified cost as a barrier to needed medical services. Table 2-8 shows a striking disparity in health care access between insured and uninsured residents of Missouri. Nearly 40% of uninsured respondents indicated a time when they needed health care but did not receive it due to cost. This percentage is significantly smaller for privately and publicly insured individuals (5.5% and 7.2%). This suggests that from an economic perspective underinsurance is not a big issue for a majority of those with coverage.

Table 2-8. Percentage of Missouri Residents Who Needed Care but Did Not Receive it Due to Cost

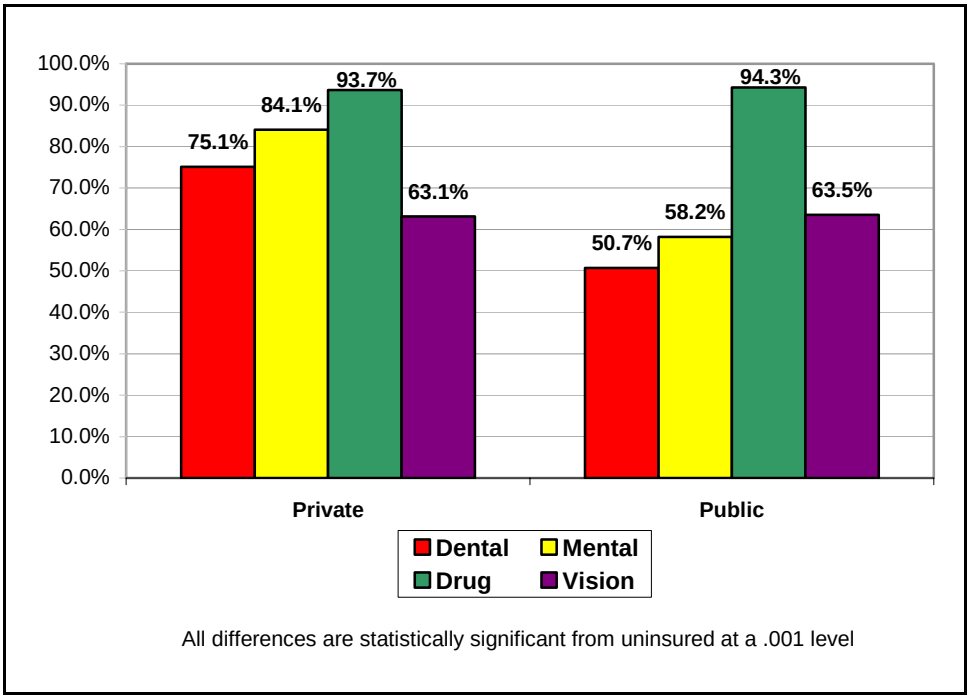
Source of Insurance	Yes	No	
Private	5.5%	94.5%	***
Public	7.2%	92.8%	***
Uninsured	38.9%	61.1%	

* p<.05, ** p<.01, *** p<.001

Using a structural approach to identifying underinsurance in Missouri, we examined the comprehensiveness of residents' health care coverage. Figure 2-5 displays the percentage of privately and publicly insured individuals with dental, mental health, prescription drug, and vision insurance benefits. People with private coverage report a more comprehensive benefits package than those with public coverage. A greater percentage of Missouri's privately insured report having dental insurance (75.1%) and mental health coverage (84.1%) in comparison to Missouri's publicly insured population with coverage at 50.7% and 58.2%, respectively.

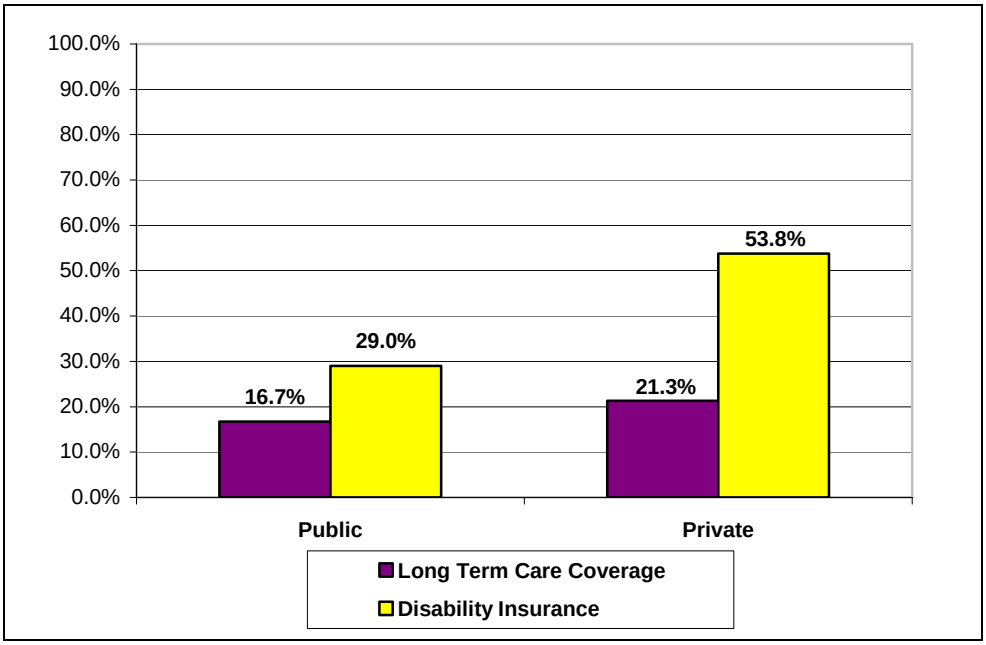
This is somewhat surprising because Missouri Medicaid covers dental and mental health services. It may be that Medicaid recipients need more information on benefits covered by the plan. The underreporting of benefits by Medicaid enrollees may also be due to a lack of providers that accept Medicaid. Enrollees who are unable to find a dental or mental health care provider who accepts Medicaid may incorrectly assume the plan does not cover these benefits.

Figure 2-5. Percentage of Missouri Residents with Dental, Mental Health, Prescription Drug and Vision Insurance



In addition to dental, vision, mental health, and drug coverage, the survey measured the percentage of Missouri residents that have long-term care and disability insurance. Long-term care insurance is relatively uncommon, carried by only 21.3% of privately insured and 16.7% of publicly insured individuals. Disability coverage was more common with 53.8% of privately insured and 29.0% of publicly insured having disability insurance. From a structural perspective, the publicly insured appear to be more likely than those with private coverage to be underinsured for long-term care ($p < 0.01$) and disability coverage ($p<0.001$).

Figure 2-6. Percentage of Missouri Residents with Long-Term Care and Disability Insurance



Using an attitudinal approach to studying underinsurance in Missouri, survey respondents were asked how worried they were that over the next year they would not be able to afford the prescription drug or health care services that they need. Table 2-9 shows the differences in the degree of worry among privately and publicly insured compared with the uninsured. The uninsured population of Missouri is more likely to experience anxiety about accessing health care services because of cost. However, many of the privately and publicly insured respondents also voiced concern over this matter.

Table 2-9. Attitudes about affordability of prescription drugs and health care services

	Insurance Type (Percentage)		
Sentiment	**Private**	**Public**	**Uninsured**
Very Worried	11.3%	23.9%	45.4%
Somewhat Worried	18.7%	22.3%	26.6%
Not Too Worried	26.2%	19.7%	13.5%
Not Worried	43.7%	34.1%	14.5%
Scale		**Mean Score (Based on Scale)**	
Very Worried = 1,..., Not Worried = 4	3.02 ***	2.64 ***	1.97 ***

* p<.05 ** p<.01 ***p<.001

Chapter 3

Employer-Based Coverage

This chapter examines the characteristics of Missouri firms that offer health insurance to their employees as well as the characteristics of the health plans offered by Missouri employers.

What Are The Characteristics of Firms That Do Not Offer Coverage, As Compared to Firms That Do?

Table 3-1 provides information on health insurance offer rates by employer characteristics. Overall, 67.5% of survey respondents were employed. Among the employed, 74.2% reported working for firms that offer coverage.

There are sizeable differences in access to coverage depending on the size of one's employer. One in four (25.8%) of workers employed in small firms with fewer than 11 employees are offered coverage. In comparison, nine of ten workers (90.5%) in large firms with 101 or more employees are offered coverage.

Employee income is also related to the availability of employer-sponsored health insurance. Approximately 33.8% of working people earning incomes below the poverty level are offered health insurance coverage, while individuals earning more than 300% of the federal poverty level (82.4%) are over twice as likely to be working for firms that offer health insurance.

People working in agriculture and personal service industries are the least likely to be offered health insurance by their employers. Many of these individuals may be self-employed or work for small employers. In addition, part-time and temporary employees are less likely to be offered coverage than their full-time or permanent counterparts.

Table 3-1. Health Insurance Offer Rates by Selected Employer Characteristics, 2004

	Offer Rate	
Overall Rate of Employer Offering Insurance Coverage	**74.2%**	
Employer Size		
< 11 employees	25.8%	***
11-50 employees	70.4%	***
51-100 employees	88.8%	
101+ employees (reference group)	90.5%	
Employee Income (as % of FPL)		
<100%	33.8%	***
100-133%	38.4%	***
134-150%	49.1%	***
151-200%	65.0%	***
201-250%	75.3%	*
251-300%	68.7%	***
>300% (reference group)	82.4%	
Industry Sector		
Education	84.2%	
Manufacturing	82.5%	
Finance	82.2%	
Transportation	80.8%	
Government (reference group)	78.3%	
Healthcare	76.7%	
Professional	72.4%	
Social Services	70.2%	
Business Service	66.4%	*
Retail	65.4%	***
Entertainment	59.7%	*
Construction	50.4%	***
Agriculture	41.7%	***
Personal Service	23.7%	***
Other	73.6%	
Type of Employment		
Permanent (reference group)	73.6%	
Temporary	42.7%	***
Seasonal	40.6%	***
Hours Worked		
0-10	51.4%	
11-20	42.9%	
21-30	37.1%	
31-40	77.0%	
41+ (reference group)	76.4%	

* p<.05 ** p<.01 ***p<.001

What Are the Characteristics of the Health Benefits Packages Offered by Employers?

Employees covered by employer-sponsored insurance were asked about the extent of their benefits and if their plan requires co-pays, a form of cost sharing that alleviates the financial burden on an employer. As displayed in Table 3-2, employer-sponsored insurance in Missouri appears to be quite comprehensive with 95.6% of respondents indicating prescription drug coverage and 86.6% reporting mental health care benefits. Dental (79.0%) and vision (65.9%) coverage are significantly less likely ($p < 0.001$) than mental and prescription drug benefits to be included in employer-sponsored insurance packages.

Cost sharing through the use of co-payments is widely used among Missouri employers that offer health insurance coverage. Of the 88.5% of respondents reporting co-payments as part of their

insurance plans, 59.6% indicated that the payments range from $11-$20 while 27.6% reported a range of $1-$10.

Table 3-2. Benefits of Employer-Sponsored Health Care Coverage

	Insurance Type
Benefit options	**Employer sponsored**
Have Co-pay	88.5%
Have Dental Coverage	79.0%
Have Mental Health Coverage	86.6%
Have Prescription Drug Coverage	95.6%
Have Vision Coverage	65.9%
Co-pay Amounts	**Percent of Respondents Who Report a Co-pay**
$1-10	27.6%
$11-20	59.6%
$21-50	12.3%
$50+	0.4%

Chapter 4

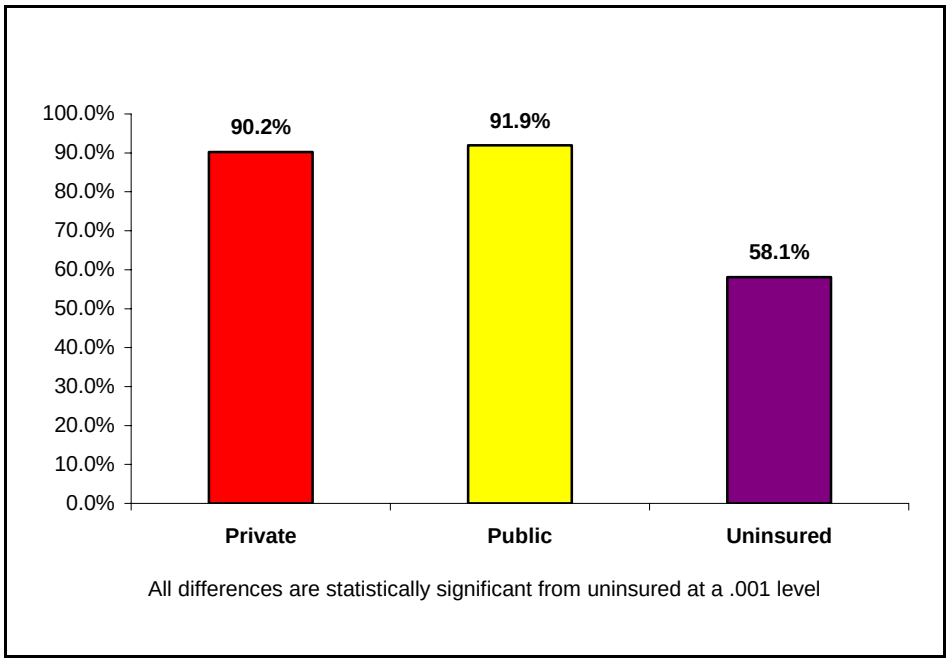
Health Care Utilization

This chapter compares how the insured and uninsured populations in Missouri utilize health care services to meet medical needs. This chapter addresses where the insured and uninsured receive health care services as well as how frequently they receive medical care.

How Are the Uninsured Getting Health Care Needs Met?

Having a regular source of care is associated with fewer delays in receiving care, better preventive care, and enhanced treatment. Figure 4-1 shows that the percentage of uninsured with a regular source of care (58.1%) is significantly lower than the percentage of people with insurance, regardless of whether the source is public (91.9%) or private (90.2%).

Figure 4-1: Missouri Residents with a Regular Source of Care by Type of Insurance



Where Do the Uninsured Go for Health Care?

Respondents, who indicated a regular source of care, were asked where they receive their care. Table 4-1 depicts the distribution of these sources. A significantly higher proportion of the uninsured compared to the publicly insured and the privately insured indicated receiving care in the emergency room (10.8% vs. 3.2% and 2.1%) and in clinics (32.5% vs. 23.1%. and 12.9%). Persons with private coverage and those with Medicaid were significantly more likely than the uninsured to receive care in a doctor's office (84.0% and 71.6% vs. 52.6%).

Table 4-1. Distribution of Health Care Sources for Those with a Regular Source of Care

Source	Type of Insurance		
	Uninsured	Public	Private
Emergency Room	10.8%	3.2% **	2.1% ***
Clinic	32.5%	23.1% **	12.9% ***
Doctor's office	52.6%	71.6% ***	84.0% ***
Hospital	0.8%	0.8%	0.4%
Military	0.6%	0.9%	0.4%
Other	2.7%	0.4%	0.2%
	100.0%	100.0%	100.0%

* p<.05, ** p<.01, *** p<.001

Missouri residents use different types of clinics for their regular source of care as shown in Table 4-2. Uninsured and publicly insured individuals are more likely to use a public clinic than those with private insurance (45.0% and 38.2% vs. 13.1%). Likewise, approximately half (50.5%) of privately insured individuals use private clinics as a source of medical care in comparison to 27.3% of the uninsured and 33.8% of those with public coverage.

Table 4-2. Distribution of Clinic Types for Those with a Regular Source of Care

Source	Type of Insurance		
	Uninsured	Public	Private
Public Clinic	45.0%	38.2%	13.1% ***
Hospital Outpatient	25.1%	25.8%	32.0%
Private Clinic	27.3%	33.8%	50.5% ***
Other	1.7%	1.1%	3.1%
Military	0.9%	1.0%	1.3%
	100.0%	100.0%	100.0%

* p<.05, ** p<.01, *** p<.001

How Does Health Care Utilization of the Insured and Uninsured Compare?

Table 4-3 displays the degree to which the insured and uninsured populations utilize health care services. Overall, the uninsured use fewer services than the insured respondents, with the exception of the emergency room care where the rates between the two groups are comparable. Uninsured individuals are more likely than their insured counterparts to have had no doctor visits (40.2% vs. 28.3%) in the past three months. Moreover, the most significant difference in utilization between insured and uninsured individuals were overnight hospital stays in the past 12 months where uninsured individuals' rate of overnight stays is less than half that of insured individuals (3.9% vs. 10.1%).

Table 4-3. Health Care Utilization by Insurance Status

	Insured	Uninsured	
Doctors Visits in Past 3 months			
0	28.3%	40.2%	**
1	35.9%	34.4%	
2	15.8%	10.3%	**
3+	20.1%	15.2%	
Overnight Hospital Stay in Past 12 months?			
Yes	10.1%	3.9%	***
No	89.9%	96.2%	***
Number of Hospital Admissions in Past 12 months			
0	0.8%	7.1%	
1	72.7%	85.8%	
2	16.4%	0.0%	***
3+	10.2%	7.1%	
Emergency Room/Urgent Care in Past 12 months?			
Yes	23.7%	22.6%	
No	76.3%	77.5%	

* p<.05, ** p<.01, *** p<.001

A topic of particular interest to Missouri policy makers was the relationship between coverage status and utilization of family planning services. Approximately 300,000 residents of Missouri use family planning services. Respondents who indicated they did not use family planning services were asked for reasons behind their decision. The results in Table 4-4 suggest that the cost of family planning services poses a greater barrier to care for the uninsured than for insured individuals. A notable 15.6% of uninsured respondents said they did not obtain family planning services because it was "too expensive," in comparison to only 1.5% of the insured respondents. Furthermore, of the subpopulation that did not obtain family planning services, a larger proportion of insured respondents (85.1%) compared to uninsured respondents (65.4%) indicated the services were not needed. Thus, it is not the case that the uninsured have lower rates of utilization because services were not needed.

Table 4-4. Reasons for Not Obtaining Family Planning Services

	Insured	Uninsured	
	(Percent Agree)		
Not sure where to get care	0.5%	2.3%	
No providers in area	0.3%	1.0%	
Insurance doesn't cover	1.3%	2.4%	
Too expensive	1.5%	15.6%	***
Didn't need services	85.1%	65.4%	***
Other	7.4%	9.5%	
Not necessary	3.9%	3.9%	

p<.05, ** p<.01, *** p<.001

Chapter 5

Summary and Conclusions

The Missouri Health Care Insurance and Access Survey was the largest and most comprehensive survey on health coverage ever fielded in the State of Missouri. Survey results suggest that 8.4% of Missouri residents are uninsured. This rate is lower than the national average of 15.6% and is lower than federal survey estimates for Missouri, which range from 11.0% to 13.2%.[9]

There is ample reason to believe that the findings from the 2004 Missouri Health Care Insurance and Access Survey are likely a better estimation of the actual rate of uninsurance in Missouri, primarily because the survey sample was larger and the survey focused solely on health insurance. Although variations in the actual uninsurance estimates are observed, the personal characteristics of the uninsured and the factors associated with being uninsured are consistent between the Missouri Health Care Insurance and Access Survey and national survey results. This provides further evidence of the validity of the survey findings.

This section highlights notable results that should be considered as Missouri policy makers move forward in their efforts to make affordable, high quality health insurance coverage available to all Missouri citizens.

Subpopulations with High Rates of Uninsurance

The results of the 2004 Missouri Health Care Insurance and Access Survey indicate there are population groups within Missouri that experience significantly higher rates of uninsurance than the state average.

Some potentially important groupings when targeting coverage expansion options and/or crafting outreach strategies include:

- Adults (19-24 year olds in particular);
- Individuals and families with income below 150% FPL;
- Those with fair or poor health status; and
- Residents of northeast and southeast Missouri.

It is likely that no single strategy will be effective in expanding coverage for all groups that experience higher rates of uninsurance. Consequently, policy makers should consider taking a multi-faceted approach to meet the needs of Missouri's uninsured individuals.

Uninsured Lack a Regular Source of Care

The uninsured are less likely to have a regular source of care when compared to their publicly and privately insured counterparts. Having a regular source of care is associated with fewer delays in receiving care, better access to care, and better health outcomes. Providing insurance coverage will not guarantee a regular source of care – research has shown that many people do not see the need for a regular source of care because they seldom or never get sick.[10] However, providing coverage will foster the attainment of a regular source of care and the concomitant benefits of having one.

[9] U.S. Census Bureau (2004) and CDC (2004)
[10] RWJF Synthesis Project, September 2001. Accessed at http://www.rwjf.org/ September 14, 2004.

Uninsured Use More Emergency Room Services

The finding that many uninsured people who report having a regular source of care also report seeking care in an emergency room is concerning since emergency rooms are a costly source of care and do not provide the continuity of care that seeing a physician in a clinic or office setting does. Decreasing the uninsured population's utilization of emergency room services and increasing use of clinics could potentially decrease hospitals' uncompensated care expenditures and improve the continuity and quality of care.

Evidence of Underinsurance

The results of the Missouri Health Care Insurance and Access Survey provide insight into the extent of underinsurance among Missouri's insured population. Taking an economic approach to studying underinsurance in Missouri, we examined the number of individuals who identified cost as a barrier to needed medical services. Approximately 7.2% of the publicly insured and 5.5% of the privately insured have forgone care due to cost in the past year, a commonly used measure of underinsurance. This rate is substantially lower than the national rates for the insured obtained by the National Survey on Health Care conducted in 2002 where 18% had postponed care they thought they needed.

Using a structural approach to identifying underinsurance in Missouri, we examined the comprehensiveness of residents' health care coverage. People with private coverage report a more comprehensive benefits package than those with public coverage. A greater percentage of Missouri's privately insured report having dental insurance (75.1%) and mental health coverage (84.1%) in comparison to Missouri's publicly insured population with coverage at 50.7% and 58.2%, respectively.

This is somewhat surprising because Missouri Medicaid covers dental and mental health services. It may be that Medicaid recipients need more information on benefits covered by the plan. The underreporting of benefits by Medicaid enrollees may also be due to a lack of providers accepted Medicaid. Enrollees who are unable to find a dental or mental health care provider who accepts Medicaid may incorrectly assume the plan does not cover these benefits.

Employer-Sponsored Coverage

The state of employer coverage in Missouri is in line with national trends. Health insurance offer rates among firms vary according to firm size and employee job characteristics. Individuals working for firms with 10 or fewer employees, for lower wages, and in temporary or seasonal jobs are least likely to be offered health insurance. In addition, firms operating in the agriculture and personal service industries insurance had the lowest offer rates.

Conclusion

The challenge of covering the uninsured has recently been exacerbated by the combination of falling revenues and expenditure growth in health care at the state and local levels. Moreover, the current economic recession and rising unemployment negatively impacted employers' willingness to offer coverage over time. As a result, many states are focusing on minor incremental strategies for increasing coverage, at least in the short term. Further research and monitoring will be needed in Missouri to determine the impacts of these social forces as well as the possible effects of any coverage expansion policies.

Appendix A: Sampling, Weighting and Imputation

The Missouri project team was interested in obtaining health insurance coverage estimates for a representative sample of people living in Missouri. The Missouri Health Insurance Survey team set out to achieve precise estimates for 7 regions, Blacks, Hispanics, and low-income people in Missouri (below the Federal Poverty Level - FPL). Base population estimates used to develop the sample were taken from US Census Bureau's 2002 estimates. The 2000 Census data provided the county estimates of the percent of people in each county who reported their race or ethnicity as being Black or Hispanic and number of those reporting family incomes below the poverty level. Table 1 shows the general demographic breakdown for the state of Missouri that will be used to evaluate the various sampling options described herein.

Table 1: Basic Demographics of Missouri Regions

Region	Most Populated County In Region	Total Population	Percent Black	Percent Hispanic	Poverty Rate
Missouri		5672579	11.5%	2.2%	11.7%
1	Jackson	1093687	15.4%	4.6%	9.5%
2	Saint Louis	2027841	19.4%	1.6%	9.4%
3	Boone	670251	5.2%	1.8%	12.9%
4	Greene	831427	1.2%	2.3%	13.6%
5	Cape Girardeau	554053	5.0%	1.1%	17.9%
6	Buchanan	241585	3.2%	1.7%	13.0%
7	Marion	253735	3.3%	1.5%	14.6%

Total Population Estimates Taken From 2002 Census Bureau County Estimates;
Percent Black, percent Hispanic, and the percent in poverty taken from Census 2000 County Data

In order to reach the desired level of precision we estimated that we would need a sample size of 800 cases per region (5,600 total respondents) and the potential need for over-sampling low-income households, Blacks and Hispanics. We evaluated different options to allocate the sample across the strata. Various sample design options are described in the following sections. The associated tables contain several columns: (1) Total sample size; (2) Total Black; (3) Total Hispanic, (4) Total Number in Poverty. The total sample size is the total number of expected respondents based on sampling and the demographic distribution of people presented in Table 1. The total Black column represents the number of expected interviews with Black respondents. The total Hispanic column represents the number of expected interviews with Hispanic respondents. Finally, the total number of people in poverty column represents the total number of expected interviews with people in poverty.

Option 1: Stratified Random Sample With 800 Completed Surveys Allocated to Each Region

The simplest method of sampling given the aforementioned sample constraints is allocating 800 completes to each region. The principal benefit of such a design (see Table 2) is its simplicity compared to other more complex design methods. The major downside of this approach is that it creates a somewhat high level of disproportionate random sampling that could lead to higher

design effects (and lower precision).[11] We will deal with this problem by allocating more sample to more highly populated regions in the second option. Option 1 also yields very few Hispanic completes (117), and Black completes (422) for precise estimates.

Table 2: Stratified Random Sample With 800 Completes Allocated to Each Region

Region	Most Populated County In Region	Total Sample Size	Total Black	Total Hispanic	Total Poverty
Missouri		5600	422	117	728
1	Jackson	800	123	37	76
2	Saint Louis	800	155	12	76
3	Boone	800	42	14	103
4	Greene	800	10	19	109
5	Cape Girardeau	800	40	9	143
6	Buchanan	800	25	14	104
7	Marion	800	27	12	117

Option 2: Stratified Random Sample With 800 Completes Set as the Minimum in Any One Region and an Additional 500 Completes Allocated Between the Three Largest Regions Relative to Region Population Size.

Option 2 allocates an additional 500 completed surveys among the three largest regions relative their overall population size. The Jackson, Saint Louis, and Greene regions all gain sample as a result. This should help decrease the degree of disproportionate sampling and result in higher precision for the survey's estimates. Furthermore, this approach ends up with close to 800 interviews completed with people in poverty. The major disadvantage to this sampling option is that, like the Option 1, it ends up with very few Black (494) and Hispanic interviews (130).

[11] The design effect is equal to the ratio of the variance taking the survey design features (stratification, differential probability of selection, and clustering) under consideration, to the variance calculated under the assumption that all cases were sampled through a simple random sample procedure.

Table 3: Stratified Random Sample With a Minimum 800 Completes Allocated to Each Region With the Remaining 500 Cases Spread Optimally

Region	Most Populated County In Region	Total Sample Size	Total Black	Total Hispanic	Total Poverty
Missouri		6100	494	130	780
1	Jackson	938	145	43	90
2	Saint Louis	1057	205	16	100
3	Boone	800	42	14	103
4	Greene	905	11	21	123
5	Cape Girardeau	800	40	9	143
6	Buchanan	800	25	14	104
7	Marion	800	27	12	117

Option 3: Option 2 Plus an Additional 600 Sampled Cases to Telephone Numbers Most Likely to Result in a Black Respondent and 300 Interviews to Telephone Numbers Most Likely Result in a Hispanic Respondent.

Table 4: Total Sample Sizes For the State, and Expected Black and Hispanic Completes

Total Popualtion	5672579
Total Sample Size	7000
Total Black	794
Total Hispanic	310

We can improve on the shortcomings of Option 2 by allocating an additional 900 completes to two specialized sampling frames (raising the total sample size to 7000). 600 completes would be targeted to telephone numbers that are more likely to result in interviews with a Black person. The 600 completed interviews will be directed to densely populated Black areas (average of 50 percent Black). This should result in 300 additional Black interviews for a total of 794 completes with Black people in Missouri. Reaching 800 completes with Hispanics will be much more difficult. Instead we will try to reach over 300 completed surveys with Hispanics by allocating 300 completes to a list-based sample of telephone numbers that are associated with Hispanic surnames. This approach targets a pocket of Hispanics that tend to have a 60 percent prevalence rate of self-identified Hispanics (according to Genesys Sampling -- a national Random Digit Dial sampling firm). We assume the list will yield an actual Hispanic household 60 percent of the time (the other 40 percent are assumed to be white non-Hispanic). The drawback to this approach is that it makes weighting somewhat more complicated.

Option 3 combines Option 2 with Black and Hispanic over samples and results in a total of 7000 completed surveys with 794 being completed by Blacks, and 310 being completed by Hispanics. Although this technique will increase the state-wide design effect it does have the effect of reducing the standard errors of Black and Hispanic uninsurance estimates.

The Missouri project team decided to pursue the sampling design presented as Option 3 (See table 4 for totals): Option 2 plus an additional 600 sampled cases to telephone numbers most likely to result in a Black respondent and 300 interviews to telephone numbers most likely to be Hispanic. This design attempted to yield a total of 7,000 completes and confidence intervals within each of the regions of plus or minus 3 percent. The confidence intervals for Blacks and people in poverty will also be close to meeting the plus or minus 3 percent threshold.

Unfortunately, the Hispanic sample cannot reach this mark without having some respondents selected with a high probability of selection (e.g. close to 1) for a large proportion of the Hispanic respondents. The high probability of selection results from the fact that less than 3 percent of Missouri's population is Hispanic. The relatively high probabilities of selection for Hispanics relative to other sampled elements will drive up the design effect. Although it is not feasible to reach the goal of 800 Hispanic respondents we can obtain a secondary threshold with 300 completed interviews the confidence interval will be slightly under plus or minus 5 percent.

Weighting

The aim of weighting survey data is to make the respondents selected to take part in the Missouri survey representative of Missouri's entire population. This was accomplished by weighting respondents relative to their probability of selection into the sample. This process is made more difficult by the fact that not all the respondents have the same probability of inclusion into the sample. The probability of selection varied by: (1) the stratum the respondent was in, (2) how many phone lines were connected to a household, and (3) the number of people living in a household (each of these is discussed in more detail below). Weighting the respondents relative to their probability of selection into the sample accomplishes two key goals: (1) having the sampled respondents represent the entire population of Missouri, and (2) controlling for the fact that the respondents did not all have the same probability of selection into the sample.

The Missouri sample design did not draw actual people, but rather it drew phone numbers randomly. Phone numbers consist of three pieces: XXX-YYY-ZZZZ. The XXX is called an "area code," the YYY is called an "exchange," and the ZZZZ is called a "stem." The RDD samples were drawn from phone numbers that are in active area codes plus exchange groupings within the state of Missouri. The stems within an active area code plus exchange group are divided into 100 groups of 100 consecutive telephone numbers (called 100 banks) and telephone numbers are randomly drawn from 100 banks with at least one listed telephone number in the interval.

In the Missouri survey there was one additional consideration. Several numbers are chosen to be part of the sample because they came from a directory listing of a residential phone numbers associated with a Hispanic surname. All listed telephone numbers in Missouri that had an associated Hispanic surname were taken out of the 100 banks and not eligible to be sampled as part of the RDD. Instead they were all sampled separately as part of a Hispanic surname listed telephone number stratum.

Basic Probability

An important assumption in our weighting scheme is that within each stratum each phone number has an equal probability of selection. Then the basic probability is equal to:

> *Probability of selecting a phone number (PSPN)=(Total number of phone numbers selected into the sample)/(Total number of phone numbers from which the sampled numbers were drawn)*

The total number of phone numbers from which the RDD sampled numbers were drawn was determined by how many "100 banks" were used by the vendor (Genesys). All possible numbers from an (area code + exchange) combination were broken down into intervals of 100 (for example, 651-625-0000 to 651-625-0099). If there was a listed telephone number within the block of 100 numbers, then all the numbers within the 100 bank was eligible to be sampled. The denominator was, therefore, the number of banks used for sampling within the state multiplied by 100, minus the number of Hispanic surnames listed telephone numbers within the banks. The total for the Hispanic listed Hispanic surname sample was generated by Genesys by counting the universe of telephone numbers in Missouri that are listed and have a Hispanic surname associated with the listing. The total number of phone numbers selected into the sample was determined by counting the number of numbers actually called as part of the survey.[12]

[12] Genesys' screening process screens out business numbers through cross listing the numbers with listed businesses, and Genesys dials the remaining numbers to screen out disconnected numbers as well.

Response Rate Adjustment

The probability of selecting a phone number is further adjusted by the response rate. For the purpose of weighting, the response rate is defined as the total number of completed surveys, divided by the total number of phone numbers in the sample.

Response rate adjusted probability of selecting a phone number=(Response rate) (Probability of selecting a phone number)*

Table 5 contains the targeted number of completes, the actual number of completes and the response rate adjusted probability of selecting a phone number.

Table 5: Targeted Number of Completes, Actual Number of Completes and Response Rate Adjusted Probability of Selection

Stratum	Targeted Number of Completed Surveys	Actual Number of Completed Surveys	Universe of Telephone Numbers	Response Rate Adjusted Probability of Selection
Jackson	938	945	1012880	0.00093
Saint Louis	1057	1058	1806751	0.00059
Boone	800	800	709582	0.00113
Greene	905	910	912697	0.00100
Cape Girardeau	800	799	491764	0.00162
Buchanan	800	801	271350	0.00295
Marion	800	799	317181	0.00252
Black Phone Numbers	600	605	309919	0.00195
Hispanic Phone Numbers	300	305	25217	0.01210
Total	7000	7022	5857339	0.00120

Phone Line Adjustment

The response rate adjustment is not equal to the probability of selecting any one household because households have an unequal number of phone lines leading to them. We can use the number of phone lines connected to a household to adjust a household's probability of selection into the sample.[13] Information regarding the number of residential phone lines in each respondent's home is collected as part of the interview and it is used to make the following adjustment to the response rate adjusted probability of selecting a phone number:

Probability of selecting a household=(number of phone lines within a selected household)(Response rate adjusted probability of selecting a phone number)*

Basic Person Probability

The purpose of the weighting scheme was to develop person weights. Within each household only one person was selected for an in-depth interview. In general, people in larger households have a smaller probability of being included than people in smaller households. The ultimate probability of selecting a person is equal to:

[13] This number was not be allowed to exceed three, even though some households have more than 3 phone lines.

Probability of selecting a person=(Screen adjusted probability of selecting a household)(1/The number of adults living in the household)*

Basic Person Weight

The basic person weight is equal to the inverse probability of selecting a person, or:

Basic person weight=1/Probability of selecting a person

Post-stratification

The goal of post-stratification is to adjust the person weights to match known population distributions of a given group.

Post-stratified weight=(Basic person weight of the person in a group)((Known population distribution for group)/(Sum of the basic person weights in a post-stratified grouping))*

Post-stratifying the basic person weights ensures that the sum of person weights will equal known population distributions. For the Missouri survey, we post-stratified by four age groups (0-17 year olds, 18-29 year olds, 30-64 year olds, and 65 and over) race (black versus all else). The post-stratification adjustments were made using the 2002 American Community Survey estimates for the state of Missouri's non-institutionalized population.

We used the 2003 Current Population Survey's Annual Demographic Supplement(CPS-ADS) estimate of the number of people without phones in Missouri to perform the non-telephone coverage adjustment on the data. The basic assumption is that those people who lacked phone service for a week or longer during the past year are very similar to those who do not have service. People who did not lack phone service differ with respect to health insurance coverage from those who did or those who did not have
phones at all. Thus, the 2.6 percent of people in Missouri who live in households without phone service, are added to the weight total of those who lacked phone service for a week or longer (see Davern, et al. forthcoming Fall 2004 for a detailed description of this technique as applied to a state survey of health insurance coverage).

Income Imputation

In survey research there is a substantial amount of missing data for certain types of items (e.g., income) because survey respondents refuse to answer the questions for some reason. If the organization collecting the data decides to not impute missing values, they have made an assumption that the respondents with missing data are no different from the people with reported data. This assumption does not hold up under examination. For example, in 2001 Colorado Household Survey the respondents with missing data on income had higher levels of education than those without missing income data. Higher levels of education are related to higher levels of income. Thus, the assumption that the respondents with missing data are no different than the respondents with reported data is incorrect and estimates derived from this assumption will be biased.

For the Missouri survey data, we used "hot deck" imputation. Hot deck is a process by which a respondent's valid value for a specific variable is assigned to another respondent who does not have a valid value for this variable. The respondent with the valid value is called a "donor" and a person with a missing value is called a "recipient." For example, if the donor is 35 years old, then the recipient (respondent with missing age) is given a value of 35 and the donor maintains the age of 35.

The process of selecting a donor is the most important component of the "hot deck" procedure. Potential donors are sectioned into homogeneous groups called "cells" defined by

many parameters. For example, all white, unemployed, college educated, males over the age of 65 with a valid value for the specific variable can be placed into one cell, while all non-white, unemployed, college educated, males over 65 can be placed into another cell. Recipients are matched to these homogenous cells of donors based on their characteristics. A random donor selected from the matching group supplies his/her value to the recipient.

The characteristics used to group the respondents should be highly correlated with the variable being imputed. For example, when imputing income, donors are matched with recipients based on highest educational level because education is highly correlated with income. The variables chosen to match the donors and the recipients form the basis of a "model" for predicting the imputed variable. A good imputation procedure should provide unbiased estimates of the mean and variance of the variable by correcting for potential distributional differences between people with and without reported data. The basic underlying assumption is that the value of the variable being estimated (such as state rates of health insurance coverage) is not conditional on (i.e., moderated by) the missing data mechanism[14]. For example, all those respondents with missing health insurance data do not have a different relationship between health insurance coverage and covariates than all the respondents with reported data.

Although properly specified imputation can alter basic distributional summary statistics (means and variances) from the statistics calculated using complete cases only, it should not transform the relationships among variables. If there was a relationship between two variables in the reported data it should be the same in the imputed data, and no new relationships should appear after the imputation. The basic idea of model-based (and particularly, "hot deck") imputation is to use the existing relationships within the reported data to adjust for distributional differences among those who are likely to report data and those who are less likely.

The hot deck is limited in the number of "variable levels" it can have. For example, the variable "highest degree attained" can be broken down into three variable levels (or cells) for the hot deck; less than high school, high school diploma and college degree. The number of hot deck cells is equal to the product of the number of variable levels (e.g., covered, not covered) used to match donors with recipients. If there are too many variable levels used in the hot deck, then many of the cells will not be populated with donors. The more variable levels that are used (i.e., the more hot deck cells), the more donors are needed for the hot deck to work.

Implementation of the Hot Deck

We implemented the hot deck using STATA version 8's hot deck imputation procedure (available for download from the STATA web site[15]). The survey has both a categorical income question and a continuous income question. If the continuous income question is refused (roughly 32 percent), the respondent is asked to put their income into a category. If they refuse to put their income into a category then the data are completely missing (roughly 14 percent). Using the categorical income question to help impute continuous income is called the "unfolding bracket" methodology.

The first step of the imputation implementation is to classify all the people who reported continuous income into the appropriate category and impute the missing 14 percent of categorical income. Then the fully imputed categorical income question is used to impute a continuous income for each respondent. The imputation is done iteratively with variables removed from the procedure one at a time until each person receives an imputed value. The variables used are described below:

The categorical income question used the following the total income and size of the family living off the income. To impute the categorical income poverty level the following hierarchy for each imputation iteration (variables 1-3 were always in the hot deck and the procedure went through 3 iterations). The region variable was the first removed, and so on down the list until the number of people variable was removed.

1. Age (1. Less Than 18, 2. 17-30, 3. 31-64, 4. 65 and Over)
2. Education (1. Less Than High School, 2. High School, 3. At Least Some College)
3. Race (1. Black, 2. Other)
4. Insurance Coverage (1. Any Public Coverage, 2. Private Coverage Only, 3. Uninsured)

[14] Little, R. and Rubin, D. (1987). Statistical Analysis With Missing Data. New York: Wiley.
[15] www.stata.com

5. Number of people living off the income (1. One Person, 2. Two People, 3. Three or More People)
6. Stratum

The same hierarchy was used for the continuous income imputation except that the categorical income variable became the variable one in the hierarchy, the total number of people living in the house was variable two and everything else slid down two spots. The categorical income question was never removed during the iterations for the imputation of continuous income, but each of the others was (for a total of six iterations) until everyone had an imputed continuous income amount.

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